PROPULSION DIRECTORATE

Monthly Accomplishment Report
September 2001

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TECHSAT 21 HALL EFFECT THRUSTER TESTING SUCCESSFULLY COMPLETED: On 28 August 2001, the first integrated test of the 200 W Engineering Model Hall Effect Thruster (HET) system for TechSat 21 was successfully completed. In addition to providing the primary propulsion for the three TechSat 21 satellites, this system will also serve as the Integrated High Payoff Rocket Propulsion Technology (IHPRPT) Electrostatic Phase II Demonstration. This test demonstrated the compatibility of the Engineering Model HET with a brassboard power processing unit (PPU) for the first time--a major step in reducing the risk of subsequent hardware development. Performance of the PPU and the thruster met all of the program requirements and showed adequate margin for the engineering on the flight design. TechSat 21, or "Technology Satellite of the 21st Century," is a Space Vehicles Directorate (AFRL/VS) program striving to demonstrate the use of formations of collaborative small satellites to fulfill complex missions, such as distributed aperture remote sensing or geolocation. In addition to developing the 200 W HET system for TechSat 21, PR is also flying the IHPRPT Phase II electromagnetic demonstration thruster, the AFRL Micro-PPT, and a suite of miniaturized sensors to determine thruster interactions with the spacecraft and provide on-orbit correlation with modeling and simulation efforts. (R. Adams, AFRL Public Affairs - Edwards Research Site, (661) 275-5465)


Hall Effect Thruster

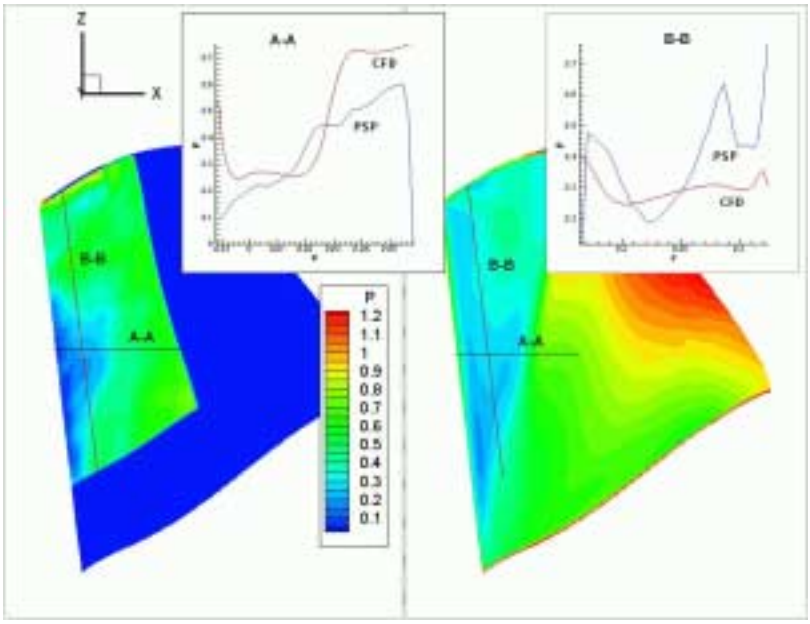

Hall Effect Thruster firing

PRESSURE MEASURING TECHNIQUE HONORED BY STATE OF OHIO: The Ohio Department of Development recently announced that Innovative Scientific Solutions, Inc (ISSI) has been selected to receive a 2001 Emerging Technology Award. These awards recognize the innovations and accomplishments of small technology-oriented companies in Ohio. This particular award honors the development of low-speed pressure sensitive paint (PSP) technology, which was jointly undertaken by ISSI and the Air Vehicles and Propulsion Directorates. The PSP technique is a non-intrusive measurement used to obtain surface pressure data on a body during wind tunnel testing. Previously, the PSP technique was limited to high-speed stationary wind-tunnel applications where large pressure gradients centered at one-atmosphere existed. This precluded the use of this new technique in the area of turbomachinery and for all automobile applications (including racing). Working with AFRL, ISSI significantly improved the pressure resolving capability and the applicable operating range of this technique to accommodate not only low-speed applications but high-pressure applications as well. Recently, ISSI researchers were able to acquire PSP data from a stationary aerodynamic body at a record-breaking low speed of 27 mph. They also recently demonstrated the new technique in a state-of-the-art compressor in PR's Compressor Research Facility (CRF). The PSP technique has great research value, as the non-

intrusive determination of pressure distributions provides critical information aiding in the understanding of complex flow mechanisms. This data is being used for comparison with computational fluid dynamics (CFD) models and has already provided AFRL valuable insight into complex aerodynamic issues. There is considerable commercial interest in this technology for use in the automotive and commercial aviation industries. (K. Navarra, AFRL/PRTF, (937) 255-2734 and G. Dale, AFRL/VAAA, (937) 255-6084)

Want more information?

- More information on ISSI's Pressure Sensitive Paint is available by clicking here.



Pressure fields obtained from an advanced transonic rotor: PSP (left) vs. CFD (right)

Pressure sensitive paint applied to a race car model

PR SUPERCONDUCTIVITY GROUP SIGNS CRADA WITH IGC SUPERPOWER: A Cooperative Research and Development Agreement (CRDA) was recently signed between IGC SuperPower, LLC, the Air Force Institute of Technology, and the Superconductivity Group of the Propulsion Directorate's Power Division (AFRL/PRP). IGC SuperPower is currently developing and scaling up for the manufacture of 2nd-generation high-temperature superconducting (HTS) conductors based on YBCO (yttrium barium copper oxide). These surface-coated conductors are fabricated in a variety of ways by a continuous process, as opposed to the PIT batch process used for 1st-generation conductors like bismuth strontium calcium copper oxide (BSCCO). Non-traditional wire fabrication approaches, such as thin film deposition, are used to produce surface-coated conductors on biaxially textured substrates. This conductor has the potential of operating high field devices at liquid nitrogen temperatures; YBCO operates at ~9 Tesla at 77 K. Short samples that carry millions of amps per square centimeter have been demonstrated at IGC SuperPower, and work continues to engineer these properties in long lengths. The PRP Superconductivity Group will be assisting IGC SuperPower with expertise and knowledge of the YBCO coated conductor to help manufacture long lengths of the HTS coated conductor. The conductor is essential for multi-megawatt generators to

provide power to electrically driven directed energy weapons currently in development. (P. Barnes, AFRL/PRPG, (937) 255-4410)

PULSED PLASMA THRUSTER TECHNOLOGY PATENTED: US Patent No. 6,269,629 was issued to Dr. Greg Spanjers of the Propulsion Directorate's Space and Missile Propulsion Division (AFRL/PRS) on 7 August 2001. This patent, entitled "Micro Pulsed Plasma Thruster (MicroPPT) Having Coaxial Cable Segment Propellant Modules," addresses the use of MicroPPTs for attitude control on spacecraft. There is a need for improved plasma thrusters for attitude control, station-keeping, and primary propulsion of very small satellites in space. These small satellites are expected to be widely used for various Air Force and commercial applications. This patent augments US Patent No. 6,153,976, "Pulsed Plasma Thruster with Electric Switch Enabling the Use of a Solid Electrically Conductive Propellant," which was awarded to Dr. Spanjers on 28 November 2000. A third patent on the MicroPPT self-triggering design is expected to be awarded in the near future. Coupled with the recent provisional patent for the MicroPPT propellant designs, these patents will fully protect the US Air Force rights to the MicroPPT design manifested for flight on TechSat 21. The MicroPPT in development for TechSat21 is the Integrated High Payoff Rocket Propulsion Technology (IHPRPT) Phase II demonstration for Electromagnetic Spacecraft Propulsion. Between the TechSat 21 flight demonstration and supporting ground tests, a thruster will be demonstrated with a 500% improvement over the 1993 baseline in terms of Total Impulse/Wet Mass. (R. Adams, AFRL Public Affairs - Edwards Research Site, (661) 275-5465)

Micro Pulsed Plasma Thruster

Want more information?

- This patent is available on line by clicking here.

CANADIAN FORCES COMMIT TO JP-8+100: The Canadian Forces have committed to changing their primary aviation fuel type from NATO F-40 (JP-4) to NATO F-34 (JP-8) with the +100 additive. The combination of F-34 with the +100 additive, called JP-8+100 in the US, carries the NATO designation of F-37. Canada's intention to make this change was declared in a 23 July 2001 letter from Lt Gen L. C. Campbell, Chief of the Air Staff of Canada's National Defence Headquarters in Ottawa, Canada. Although some of the details of this conversion are yet to be finalized, it is the Canadian Air Force's goal to commence a gradual transition to the new fuel type in October 2002. Complete changeover at all affected domestic Canadian Air Force locations is to be completed by the spring of 2003. Following this changeover, Canadian Forces wings and bases supporting land based air operations will supply F-34 fuel (with and without the +100 additive as required) instead of F-40. NATO F-44 (JP-5) will remain the primary fuel for ship borne air operations. The +100 thermal stability fuel additive was originally developed

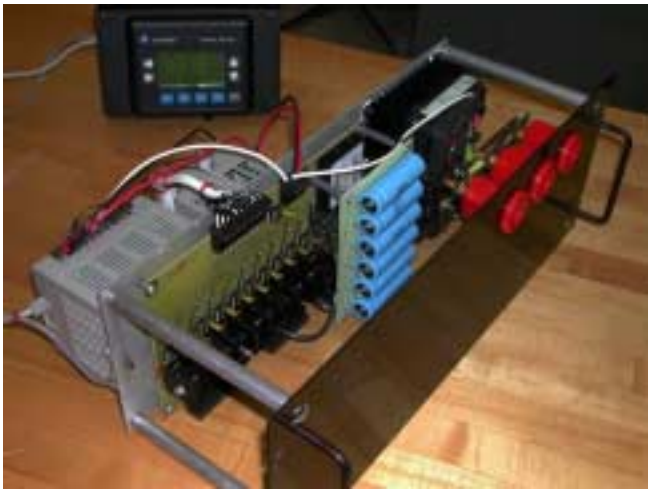
under a Propulsion Directorate program which had the goal extending the useful operating temperature of JP-8 fuel by 100°F (thus the +100 name) through the addition of a low-cost additive package. Since it was first fielded in 1994, JP-8+100 has been successfully used by thousands of US Air Force aircraft as well as numerous aircraft of allied nations. Use of the additive package has been demonstrated to markedly reduce the amount of fuel related engine maintenance. This step makes Canada the third NATO country (following the US and Denmark) to adopt the +100 additive, which is an important step towards ensuring the interoperability of NATO forces. (P. Pearce, AFRL/PRTG, (937) 255-6918)

A variety of Canadian ground-based aircraft will soon be converted to JP-8+100

COLLABORATIVE RESEARCH GARNERS NATIONAL AWARD: A team consisting of researchers from the Propulsion Directorate, ERC Inc, Hybrid Plastics, and the University of California, Irvine (UCI), was recently selected for honors for their collaborative research efforts. The Council for Chemical Research (CCR), headquartered in Washington DC, selected the team for the 2001 Collaboration Success Award. The award is presented each year to a group that shows the greatest success in organizing an industrial, academic, and/or national laboratory team. The collaboration team's efforts demonstrated that the sum is greater than the individual parts. The selection this year highlighted a three element collaboration -- government, industry, and academia. The team devoted their efforts to the basic research, development, and commercialization of POSS (Polyhedral Oligomeric Silsesquioxanes) nanotechnology. Members of the selected 2001 award team included Dr. Shawn Phillips of the Propulsion Directorate, Dr. Tim Haddad of ERC Inc., Drs. Joseph Lichtenhan and Joseph Schwab of Hybrid Plastics, and Prof. Frank Feher of UCI. The award will be presented at a future Council of Chemical Research meeting. (R. Adams, AFRL Public Affairs - Edwards Research Site, (661) 275-5465)

LOAD BANK SUPPORTS F-16 TURBOGENERATOR TESTS: The Propulsion Directorate's Power Division (AFRL/PRP) recently delivered an electric load bank to Smiths Industries of Rockford, Illinois, to assist Smiths in completing two days of successful test and evaluation of a turbogenerator for the F-16 fighter aircraft. The dynamic load bank (DLB), built in-house by PRP, is a tool for evaluating high-speed turbogenerator generator performance with a load that

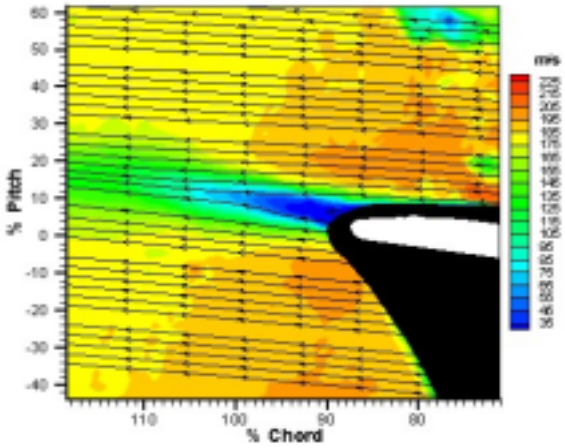
replicates the generator duty cycle for driving a radar load onboard an aircraft. In its present state, the DLB is a prototype rack mounted system consisting of two load banks. The first is a ten-element load bank with each element independently controlled by integral gate bipolar transistor (IGBT) switches. This load bank serves as a radar load simulator allowing ten-step resolution of the power offered the generator. The load bank specification allows switching at a maximum frequency of 500 Hz, and dissipating up to 16 kW at 270 VDC. The other load bank is a resistor assembly with five wire-wound nichrome heaters in parallel making 2.7 ohms. This load is pulse-width-modulated with a 200-amp IGBT, the idea being that this load will compensate for the radar load so that the generator always sees a constant power. This load bank has a maximum dissipation of 25 kW at 270 VDC. Total dissipation then is 45 kW maximum with all elements on and the duty cycle set at 100%. The DLB consists of a 19-inch rack with two independent load banks, a 1/3 HP blower, a fan bank for supplemental electronics cooling, an electronics rack, and a remotely located Panelview user interface. Cooling air is drawn from the bottom of the rack through a filtered opening, and flows across both load banks as it exits out the top of the rack. This air also cools the electronics rack, but supplemental fans were added to ensure proper flow across the switches and diodes of the rectifier. Three-phase power from the generator plugs into the front of the unit. All controls and over-temperature alarms are handled through a RS-485 serial link to a remotely located graphical user interface. This unit can be placed up to 30 feet from the load bank. The DLB is also configured to handle a grounded or an ungrounded neutral on the generator. (R. Spyker, AFRL/PRPE, (937) 656-4780)



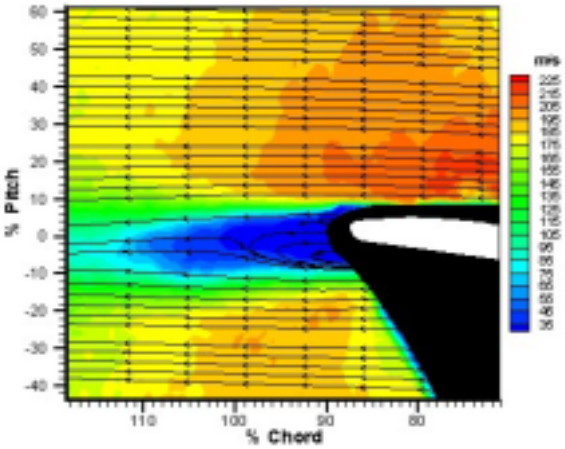
Load bank showing the power electronics section and the user interface

LINKAGE FREE VECTORING ACHIEVED: The Propulsion Directorate has collaborated with Virginia Tech to successfully demonstrate the first ever, counter-flow blowing based flow vectoring capability in a high Mach number stator cascade. This capability is a key ingredient to the Fan & Compressor Branch's (AFRL/PRTF's) High Impact Technology (HIT) Program for the Versatile Affordable Advanced Turbine Engines (VAATE) Program. Many current fan designs require flapped IGVs (a segmented stator with only the back portion rotating like a flap on an aircraft wing) to assure correct inlet flow conditions during off design operation. The ability to vector the flow without the "flap" on the IGV would greatly reduce the complexity of the fan system and result in significant weight reduction. In addition, flow vectoring within the fan and compressor could greatly reduce the need for variable stators, again reducing cost and weight. The approach demonstrated by AFRL/PRTF scientists employs pressure surface counter-flow blowing to increase blade circulation and achieve considerable flow vectoring. To explore this approach, an existing "counter swirl" cascade previously developed under AF contract was modified. To achieve the full benefit of the approach, the trailing edge of the blade had to be removed, which allows for the blowing plenum to be installed and the appropriate blowing location to be achieved. The cascade was tested in Virginia Tech's blowdown wind tunnel

facility as part of a collaborative 6.1 funded effort. PRTF and Innovative Scientific Solutions, Inc (ISSI) scientists measured the overall flowfield to verify the extent of the flow vectoring. The results clearly demonstrated that blowing caused an increase in the amount of turning relative to the baseline case. An increase of approximately 9 degrees in turning was achieved through counter-flow blowing of 1%. Based on these results, it is anticipated that even greater levels of flow vectoring can be achieved in a new blank sheet design, which is currently under way. (D. Car and W. Copenhaver, AFRL/PRTF, (937) 255-4780)

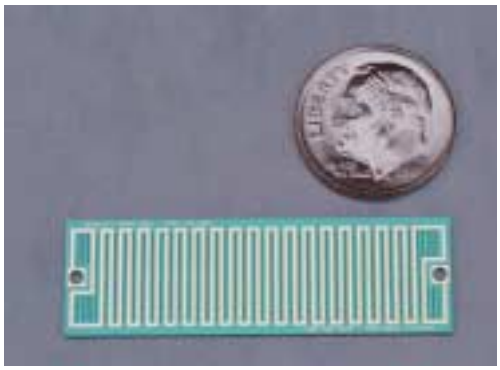


Velocity field and streamlines (no control)



Velocity field and streamlines (1% core flow)

PATENT GRANTED FOR NOVEL PROPULSION CONCEPT: US Patent No. 6,263,665 was issued to Dr. Andrew Ketsdever of the Propulsion Directorate's Aerophysics Branch (AFRL/PRSA) and Prof. Eric P. Muntz of the University of Southern California on 24 July 2001. This patent, which is titled "Microthruster for Heating a Propellant, Driving the Vapors Produced to a Discharge Section," describes the technology employed for the Free Molecule Micro-Resistojet (FMMR) concept. The FMMR is a micropropulsion system that addresses the need for low-mass, low-power, efficient, simple, and robust thrusters for microsatellites. Two flight versions of the MEMS fabricated heating element for the FMMR were recently delivered to Arizona State University (ASU) for integration into two nanospacecraft. Actual in-space testing of these FMMR components is scheduled to occur by the end of 2003, when they will be carried into space aboard NASA's Space Shuttle. (R. Adams, AFRL Public Affairs - Edwards Research Site, (661) 275-5465)


MEMS fabricated FMMR heater element


FMMR flight structure delivered to ASU

Want more information?

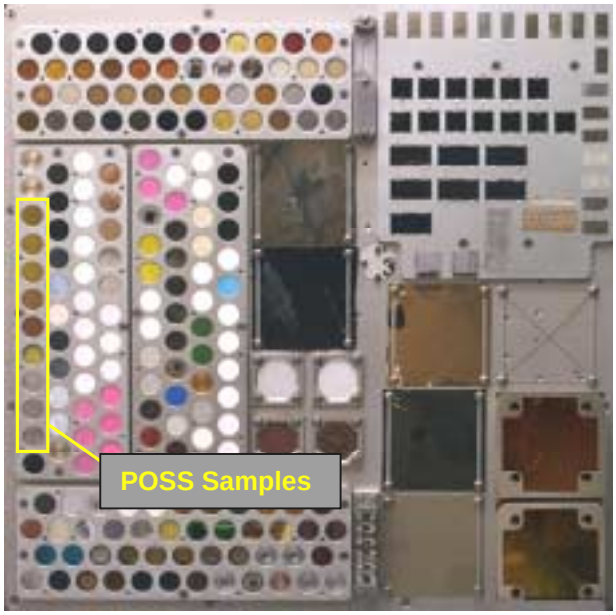
- This patent is available on line by clicking here.

PR SCIENTIST APPOINTED ASSOCIATE EDITOR: Dr. William W. Copenhaver, of the Propulsion Directorate's Fan & Compressor Branch (AFRL/PRTF) has been appointed by the Fluids Engineering Division of the American Society of Mechanical Engineers (ASME) to be Associate Editor of the *ASME Journal of Fluids Engineering*. He will serve a three-year term as Associate Editor to officially begin in January 2002. Dr. Copenhaver was requested by the Editor in Chief of the Journal to begin his duties several months early because of his excellent service record while serving as associate editor in the past. This is the second journal for which Dr. Copenhaver has served as associate editor; the first being the American Institute of Aeronautics and Astronautics (AIAA) *Journal of Propulsion and Power*. Dr. Copenhaver will be responsible for establishing journal level quality of over 20 manuscripts per year submitted to the Journal by international researchers relating to the field of turbomachinery. This appointment is a direct result of Dr. Copenhaver's leadership role and publication history in turbomachinery research throughout the world. (M. Stibich, AFRL/PRTF, (937) 255-8211)

Dr. William Copenhaver

MATERIAL SAMPLES FLOWN ON THE INTERNATIONAL SPACE STATION: Nine material samples provided by the Propulsion Directorate were carried into space on 10 August 2001 aboard the Space Shuttle Discovery as part of the STS-105 mission. These samples are part of the Materials on the International Space Station Experiment (MISSE). During the first extravehicular activity of the STS-105 mission, two sample containers were affixed outside the International Space Station. The sample containers house hundreds of different material samples that will be exposed to the low earth orbit environment (approximately 250 miles in altitude) for a year. The nine material samples provided by PR were 0.995"-diameter POSS (Polyhedral Oligomeric Silsesquioxanes) polymer discs prepared by the Polymer Working Group at Edwards AFB, California. These samples include POSS-Kaptons, POSS-BMIs, and POSS blends. During the experiment, these samples will be exposed to atomic oxygen and vacuum

A sample container is shown mounted on the outside of the International Space Station



Details of the MISSE sample tray containing the PR POSS samples (as indicated)

ultraviolet (UV) radiation. Data obtained from this experiment are crucial to better correlate test results from ground-based space environment simulations with actual space exposure. (R. Adams, AFRL Public Affairs - Edwards Research Site, (661) 275-5465)

Want more information?

❖ Extensive details on the STS-105 mission and the MISSE experiment are available by clicking here.

ROCKET RESEARCH FEATURED IN *AIRMAN* MAGAZINE: The August 2001 issue of *Airman* magazine, an official magazine of the US Air Force, features an article about research being conducted at the Propulsion Directorate's Rocket Site at Edwards AFB, California. The article, titled "Rocket Renaissance," covers various facets of research from the testing conducted at the many high-thrust rocket test stands to research on micropropulsion systems and advanced materials. Numerous members of the PR-West team are featured in the article, including Col Wesley Cox, Maj Steve Svejda, Capt Rene Gonzalez, Capt James Lake, and Dr. Wes Hoffman. The article is available both in print and on-line at the link provided below. (J. Pearce, AFRL/PRO, (937) 255-5451)

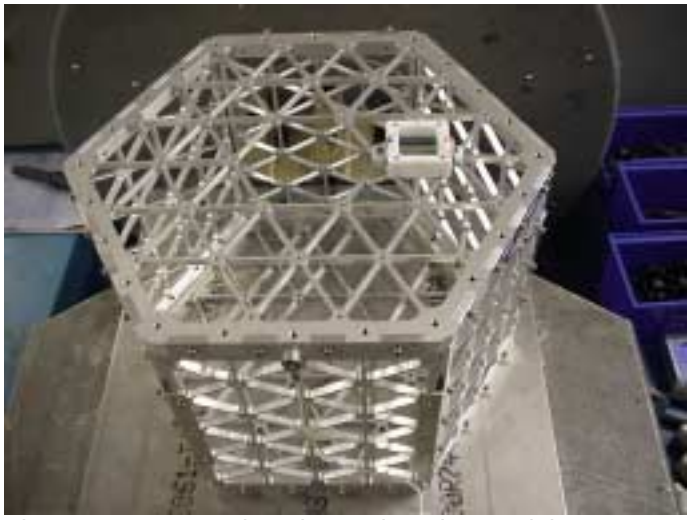
Want more information?

❖ This article is available on line by clicking here.


Capt James Lake


Capt Rene Gonzalez

MICROPROPULSION SYSTEM CLEARS MAJOR HURDLE: The Free Molecule Micro-Resistojet (FMMR) flight experiment recently cleared a major hurdle in preparation for launch aboard NASA's Space Shuttle. The FMMR flight experiment underwent a series of random vibrational tests at Dynamics Lab, Inc in Phoenix, Arizona. The tests, which were conducted in conjunction with students from Arizona State University (ASU), were three-axis random vibration tests that are standard for all Space Shuttle hitchhiker payloads. The FMMR flight hardware was shaken both by itself and installed on the engineering model structure of the ASU nano-spacecraft. The FMMR flight experiment passed the tests without incident. One of the FMMR chips was even installed with a minor crack, and the size and characteristics of the crack did not change after the testing was performed. Success in these tests was a major accomplishment, because these tests represent the last remaining obstacle prior to the actual Space Shuttle flight. These tests were conducted in conjunction with the delivery of the flight units to ASU in late July. The FMMR micropropulsion system is scheduled to be launched aboard the Shuttle by the end of 2003. (R. Adams, AFRL Public Affairs - Edwards Research Site, (661) 275-5465)



The FMMR mounted on the engineering model structure of the ASU nano-spacecraft for random vibration testing

PULSED POWER SYSTEMS STUDY FOR UAV CONCEPT: The Boeing Company (St Louis), with the support of Honeywell (Phoenix/Torrance), has completed a study of the electrical power and thermal management issues associated with integrating a pulsed high power microwave (HPM) as a directed energy weapon (DEW) on an unmanned aerial vehicle (UAV). The mission of this HPM UAV concept is to autonomously perform non-lethal strike missions against ground-based electronics. The study, led by Boeing's Air Vehicle Advanced Design Group, determined through parametric modeling that development of a high-voltage pulsed power circuit was the largest technical challenge; prime power generation and associated cooling were much lesser challenges for this particular DEW concept. Most notable were the scenarios studied with the higher energy pulsed HPMs, where extreme challenges were found in the pulse-initiating switch and the capacitor elements of the pulse-forming network. The combination of fast turn-on times and extreme current and voltage of

Conceptual pulsed high power microwave directed energy weapon on a UAV

these elements leads to unrealistic specifications for compact solid-state components. The higher pulsed-energy HPM scenarios will likely require bulky spark gap switches and coaxial pulse forming lines to meet the pulse power requirements. Boeing has shown that high voltage solid-state switching and high energy density capacitor technologies being developed by the Propulsion Directorate's Power Division (AFRL/PRP) are applicable to the HPM UAV concept with lower energy pulses. Further advancements in solid-state switching and capacitor technologies are necessary to meet the requirements for higher energy pulsed HPMs. (S. Adams, AFRL/PRPE, (937) 255-5179)

TEST RIG FABRICATED FOR ACTIVE CONTROL AND ANALYSIS OF ENGINE STARTER GENERATOR TECHNOLOGIES: Significant progress in modeling and characterization of advanced motors is being accomplished at General Electric Corporate Research and Development (GE CRD) under a program jointly funded by the Propulsion Directorate's Turbine Engine and Power Divisions. This program is exploring novel methods to control the stability of switched reluctance motors subject to external forces. This program directly benefits future turbine engines employing magnetic bearings by reducing system cost and weight while offering performance benefits. Both the GE/Honeywell (XTC 97/3) and the GE/Allison (XTC 77/1) Integrated High Performance Turbine Engine Technology (IHPTET) Phase III demonstrator cores, scheduled to run in 2003 and 2005 respectively, will employ magnetic bearings. This program will provide risk reduction in the design of the bearings and control systems. Designing electric machinery to withstand large external forces greatly impacts its size and weight. These forces are generated whenever the machine rotor is not centered in its stator, or due to mass imbalance, engine acceleration, and machine tolerance. Mitigating these forces through electronic control will minimize the weight of the generator and magnetic bearing. Results of tests on a radial force test rig in this effort should scale well to the high power requirements for a fighter aircraft sized turbine engine application. Developing fault tolerant electric machines and controls is a critical requirement on a turbine engine application. Accurate modeling and simulation of faults in this effort is an important first step in achieving this goal. As part of this effort, data taken on the radial force test rig will be used to verify and update the analytical modeling tools being developed for aerospace electric machinery at GE CRD. This program is an important first step in modeling and integration of high speed electric machinery for turbine engine applications. Future requirements for turbine engines with oil-less systems and the demand for more on-engine generated electric power make this effort an excellent investment for advanced engines. (K. Semega, AFRL/PRTA, (937) 255-6690)

ZAWADA NAMED JULY EMPLOYEE OF THE MONTH: Ms. Karen C. Zawada, secretary to the PR Director, Col Alan Janiszewski, has been named PR's Employee of the Month for July 2001. Ms. Zawada is responsible for managing the director's constantly changing calendar, arranging his complicated travel plans, and thoroughly screening and controlling all incoming and outgoing paperwork. She also recently absorbed the additional workload caused by the loss of two other senior secretaries; the secretary for the Deputy Director and Chief Scientist and the Integration and Operations Division (AFRL/PRO) secretary. Although this meant that she had to care for four executives with widely divergent interests, she cheerfully handled the expanded responsibilities. She has repeatedly demonstrated exceptional expertise in coordinating and facilitating the many high-pressure, and often conflicting, administrative activities that occur in

the directorate's front office. She has exceptional communication skills and is especially talented at working difficult and complex issues across government agencies, academia, and industry. Her efforts are crucial to the smooth, daily operation of the directorate, and she helps to ensure that outsiders see the Propulsion Directorate at its best. (Col A. Janiszewski, AFRL/PR, (937) 255-2520)


Ms. Karen Zawada

CONFERENCE PAPER FOR HIGH-TEMERATURE DIAMOND DEVICES: Dr. Susan Heidger of the Propulsion Directorate's Power Division (AFRL/PRP) presented a paper entitled "CVD Diamond for High Power and High Temperature Electronics" at the Electrochemical Society's 7th International Symposium on Diamond Materials, in San Francisco, California, 2-7 September 2001. The paper highlighted in-house research effort on diamond high-temperature passives. Data was presented illustrating the effects of surface termination and the type of materials used to form the high temperature metal contacts on the dielectric performance of CVD diamond passive devices. Diamond has many extreme properties that make it an attractive high-temperature, high-power dielectric material, including very high breakdown strength, very high thermal conductivity, low dielectric losses, high temperature stability, chemical inertness, and radiation hardness. The performance and energy density of AC/DC power filter capacitors, DC bus capacitors, and snubbers for hybrid and integrated power electronics systems would be greatly enhanced by the use of diamond dielectrics. These systems are integral for the power management and control of equipment from military aircraft engines and directed energy weapons, to industrial machinery and automobile engines. The in-house capacitor research team has successfully optimized the growth conditions to produce high-resistivity, high quality dielectric diamond films with breakdown strengths of 2-10 MV/cm. In order to maintain the stable dielectric performance at elevated temperatures, the diamond surfaces had to be oxygen terminated. This was easily accomplished by heating the diamond in air at relatively low temperatures (325°C). Contacts consisting of a thin layer of amorphous silicon, followed by 300 nm of tungsten capped with 100 nm of gold, resulted in CVD diamond test devices with excellent dielectric performance at elevated temperatures. Measured capacitance varied by less than 3% and dielectric losses did not exceed 0.02 with temperature cycling to 250°C. Room temperature dielectric losses averaged 0.003. Dielectric performance remained steady over the tested frequency range of 100--10^6 Hz. Research is continuing that further examines contact adhesion, diffusion, and resistance at even higher temperatures. This information is critical to the successful application of high temperature, CVD diamond passive devices. The capacitor in-house program is studying the suitability of CVD diamond for high temperature sensors, switches, high voltage insulators, and heat spreaders in addition to applications in passive devices. (S. Heidger, AFRL/PRPE, (937) 255-6016)

SPREHER NAMED AUGUST EMPLOYEE OF THE MONTH: Ms. Cassie J. Spreher, a Financial Specialist in the Propulsion Directorate's Financial Management Division (AFRL/PRF), has been named PR's Employee of the Month for August in the Staff Support category. Ms. Spreher provided excellent financial support through her management of the entire FY00 and FY01 budget for the Power Division (AFRL/PRP). Her normal duties entail managing AFOSR, Air Force and Ballistic Missile Defense Office (BMDO) SBIR, and BMDO funds. In addition to these normal duties, she skillfully stepped in to provide financial management support for all Power Division funds (including 6.2 and incoming external funds) during the medical absence of the senior financial analyst. Her determination, dedication, and "can do" attitude made financial management for the Power Division happen during this busy and stressful period. Through her efforts during this period, all funding documents were kept on track and the Power Division achieved all AFRL execution goals for both FY00 and FY01. In addition to her added workload during this period, Ms. Spreher continued to work on her degree at a local university and completed two Defense Acquisition University classes for Level II APDP certification. (C. Turner, AFRL/PRF, (937) 255-3044)

Ms. Cassie Spreher